

# PATENT ABSTRACTS OF JAPAN

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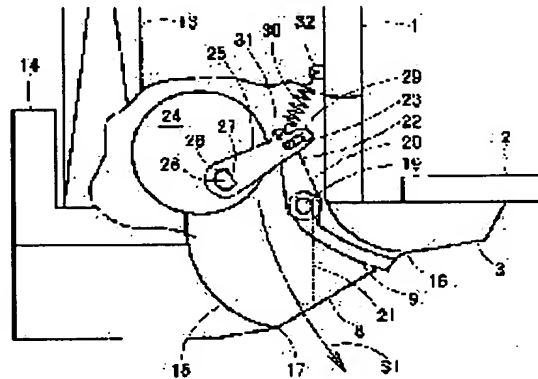
(22)Date of filing : 20.01.2000 (72)Inventor : GUNJI YOSHIHIRO

## (54) CEILING FLUSH TYPE AIR CONDITIONER

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a ceiling flush type air conditioner, having an annular blow-off hole at a circular decorative panel allowing the air blowing direction to be adjusted in the up and down direction.

**SOLUTION:** An air flow guide 15 is inclined in the circumferential direction with respect to an annular blow-off hole 8 and formed, so that the outer periphery 16 of the opening of the blow-off hole 8 locates at a higher position than the inner periphery 17, an annular air flow direction changing plate 9 inclined with the outer periphery located below the inner periphery is provided in the opening of the blow-off hole 8 and the air flow direction changing plate 9 is driven to move in parallel in the vertical direction, thereby changing the air flow direction in the vertical direction.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1] The circular makeup panel which established circular inlet port in the center and prepared the annular outlet in the underside of body casing of the shape of a cylinder embedded in the head-lining side around this inlet port is attached. To the air duct which connects said inlet port formed in said body casing, and said outlet in the head-lining flush type air conditioner which comes to prepare the circular heat exchanger arranged so that the blower and the machine of the broadcasting style which counter said inlet port and consist of the motor with a driving shaft and fan of the vertical direction may be enclosed Make the cowling duct to said annular outlet incline in the direction of a periphery, and it forms so that the periphery side of opening of said outlet may become a high location from an inner circumference side. the annular wind direction which inclined so that a periphery side might fall from an inner circumference side in opening of said outlet -- a modification plate -- preparing -- said -- a wind direction -- the head-lining flush type air conditioner characterized by coming to change a wind direction in the vertical direction by driving so that the parallel displacement of the modification plate may be carried out in the vertical direction.

[Claim 2] said wind direction -- the driving gear which drives a modification plate -- said annular wind direction -- with the notch which cut and lacked some modification plates in the direction of a right angle to the periphery The sliding shaft established so that this notch might be connected, and the guide rib which was equipped with the guide slot which guides this sliding shaft in the vertical direction, and was prepared in the direction of a right angle to the periphery at said outlet, The head-lining flush type air conditioner according to claim 1 characterized by constituting the splash edge of the splash link established in said sliding shaft free [ a splash ], and this splash link from a driving source driven in the abbreviation vertical direction.

[Claim 3] The head-lining flush type air conditioner according to claim 2 characterized by having prepared said driving source in the driving shaft of a drive motor and this drive motor free [ a splash ], and constituting the splash edge from a splash lever connected possible [ the splash edge of said splash link, and a slide ].

[Claim 4] The head-lining flush type air conditioner according to claim 3 characterized by becoming considering said drive motor as a stepping motor.

[Claim 5] the splash edge of said splash lever -- said wind direction -- the head-lining flush type air conditioner according to claim 3 characterized by coming to assist by the helper spring of the actuation load which offsets the weight of a modification plate in the pull-up direction.

[Claim 6] The head-lining flush type air conditioner according to claim 2 which makes said driving source a solenoid and is characterized by coming to connect the splash edge of said splash link with the actuation shaft of this solenoid.

[Claim 7] said driving gear -- said annular wind direction -- the head-lining flush type air conditioner according to claim 2 characterized by coming to prepare in three locations which divided the modification plate equally abbreviation 3 to the circumferencial direction.

[Claim 8] said wind direction -- the head-lining flush type air conditioner according to claim 1 characterized by coming to form a modification plate in the shape of [ which swelled caudad ] a

curved surface.

[Claim 9] said wind direction -- the head-lining flush type air conditioner according to claim 2 characterized by coming to form a modification plate and said sliding shaft in one.

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**DETAILED DESCRIPTION**

[Detailed Description of the Invention]

[0001]

[Field of the Invention] this invention -- a head-lining flush type air conditioner -- being involved -- the wind direction of a head-lining flush type air conditioner with the configuration of an outlet more annular in a detail -- it is related with the configuration of a modification plate.

[0002]

[Description of the Prior Art] two or more wind directions which were arranged in the direction of a right angle by the radial to the periphery in the annular outlet as the head-lining flush type air conditioner (it is hereafter called a round head-lining flush type air conditioner) which prepared the annular outlet was shown to the round makeup panel installed in the conventional head-lining side by JP,11-201494,A -- a modification plate -- preparing -- said -- a wind direction -- it was the configuration of having made a modification plate tilting to a circumferencial direction, and adjusting a wind direction. moreover, the wind direction tilted to each outlet of four sides as the head-lining flush type air conditioner (it is hereafter called a rectangular head-lining flush type air conditioner) which prepared the outlet in four sides of perimeters of the rectangular makeup panel installed in the conventional head-lining side is shown by JP,10-292945,A -- it was the configuration of having formed a modification plate and adjusting a wind direction up and down.

[0003]

[Problem(s) to be Solved by the Invention] however, the round head-lining flush type air conditioner of the above-mentioned configuration -- setting -- a periphery -- receiving -- the direction of a right angle -- a radial -- rectifying -- ventilating -- the air blasting -- the vertical direction -- a wind direction -- there was a trouble that it could not adjust. moreover, the wind direction extended to the longitudinal direction of an outlet in the round head-lining flush type air conditioner -- the case where a modification plate is applied -- a wind direction -- since it is necessary to make it the form which turned at the modification plate to the longitudinal direction corresponding to the form of an annular outlet -- the head-lining flush type air conditioner of the conventional rectangle -- like -- it cannot tilt -- becoming -- the wind direction of the vertical direction -- there was a trouble that adjustment was impossible. this invention -- setting -- the above-mentioned trouble -- taking an example -- the vertical direction -- a wind direction -- it aims at offering the head-lining flush type air conditioner which prepared the annular outlet on the round makeup panel which can be adjusted.

[0004]

[Means for Solving the Problem] In order that this invention may solve the above-mentioned

technical problem, on the underside of body casing of the shape of a cylinder embedded in the head-lining side The circular makeup panel which established circular inlet port in the center and prepared the annular outlet in the perimeter of this inlet port is attached. To the air duct which connects said inlet port formed in said body casing, and said outlet In the head-lining flush type air conditioner which comes to prepare the circular heat exchanger arranged so that the blower and the machine of the broadcasting style which counter said inlet port and consist of the motor with a driving shaft and fan of the vertical direction may be enclosed Make the cowling duct to said annular outlet incline in the direction of a periphery, and it forms so that the periphery side of opening of said outlet may become a high location from an inner circumference side. the annular wind direction which inclined so that a periphery side might fall from an inner circumference side in opening of said outlet -- a modification plate -- preparing -- said -- a wind direction -- it has the composition of having changed the wind direction in the vertical direction, by driving so that the parallel displacement of the modification plate may be carried out in the vertical direction.

[0005] moreover, said wind direction -- the driving gear which drives a modification plate -- said annular wind direction -- with the notch which cut and lacked some modification plates in the direction of a right angle to the periphery The sliding shaft established so that this notch might be connected, and the guide rib which was equipped with the guide slot which guides this sliding shaft in the vertical direction, and was prepared in the direction of a right angle to the periphery at said outlet, The splash edge of the splash link established in said sliding shaft free [ a splash ] and this splash link consists of driving sources driven in the abbreviation vertical direction.

[0006] Moreover, said driving source is prepared in the driving shaft of a drive motor and this drive motor free [ a splash ], and the splash edge consists of splash levers connected possible [ the splash edge of said splash link, and a slide ].

[0007] Moreover, it has composition which used said drive motor as the stepping motor.

[0008] moreover, the splash edge of said splash lever -- said wind direction -- it has composition assisted in the pull-up direction by the helper spring of the actuation load which offsets the weight of a modification plate.

[0009] Moreover, said driving source is made into a solenoid and it has composition which connected the splash edge of said splash link with the actuation shaft of this solenoid.

[0010] moreover, said driving gear -- said annular wind direction -- it has composition prepared in three locations which divided the modification plate equally abbreviation 3 to the circumferential direction.

[0011] moreover, said wind direction -- it has composition which formed the modification plate in the shape of [ which swelled caudad ] a curved surface.

[0012] furthermore, said wind direction -- it has composition which formed the modification plate and said sliding shaft in one.

[0013]

[Embodiment of the Invention] The example of this invention shown by drawing 1 thru/or drawing 6 explains the gestalt of operation of this invention. First, the whole head-lining flush type air conditioner configuration of this invention shown with the top view seen from the sectional view of drawing 1 and the lower part of drawing 2 is explained. Body casing of the shape of a cylinder by which 1 was embedded in the head-lining side 2, the makeup panel prepared as the bonnet aforementioned head-lining side 2 touched in 3 in the lower part of this body casing 1, The intake grill which equipped the bonnet tooth back with the filter 7 for the circular inlet port 6 which prepared 4 in the center of this makeup panel 3, and was equipped with the bell mouth 5, enabling free closing motion, 8 is annularly formed in the perimeter of said inlet port 6 -- having -- a wind direction -- the outlet equipped with the modification plate 9 -- To the air duct which connects said inlet port 6 formed in said body casing 1, and said outlet 8, 10 The blower which consists of the motor 11 with a driving shaft and fan 12 of the vertical direction which countered said inlet port 6 and was established, the circular heat exchanger prepared as the machine 10 of the broadcasting style enclosed in 13, and 14 are the open saucers on which this heat exchanger 13 was formed caudad.

[0014] next, the sectional view of drawing 1 , the top view seen from the lower part of drawing

2, the important section sectional view of drawing 3 and drawing 4, and the wind direction of drawing 5 -- the first example of this invention shown with the perspective view of a modification plate is explained. 15 is the cowling duct which inclined in the direction of a periphery which leads the air conditioning air which passed said heat exchanger 13 to said outlet 8, and it is formed so that periphery side 16 of opening of said outlet 8 may become a high location from inner circumference side 17. moreover -- opening of said outlet 8 -- said wind direction -- while the modification plate 9 inclined so that a periphery side might fall from an inner circumference side, it was formed in the shape of [ which swelled caudad ] a curved surface, and met the configuration of said annular outlet 8 -- it is annularly formed with synthetic resin, such as ABS (acrylic nitril styrene butadiene rubber), and is prepared.

[0015] 18 -- said annular wind direction -- the notch which cut and lacked three places of the location equally divided abbreviation 3 to the circumferencial direction of the modification plate 9 in the direction of a right angle to the periphery -- 19 connects this notch 18 -- as -- preparing -- said wind direction -- the sliding shaft formed in the modification plate 9 and one -- The guide rib which 20 formed the guide slot 21 which guides this sliding shaft 19 in the vertical direction, and was prepared in the direction of a right angle to the periphery at said cowling duct 15, The splash link which prepared 22 in said sliding shaft 19 free [ a splash ], and equipped the splash edge with the interlocking pin 23, and 24 and 25 are with the drive motor and splash lever which are the driving source which drives the splash edge of this splash link 22 in the abbreviation vertical direction. above -- carrying out -- said wind direction -- the driving gear of the modification plate 9 is constituted.

[0016] A stepping motor is used for said drive motor 24, and fitting of the driving shaft 26 and said splash lever 25 of said drive motor 24 is carried out so that it may not race with the D cut 27 and D cut hole 28. The gold coin hole 29 was formed near the head of said splash lever 25, and it has fitted in possible [ the interlocking pin 23 of said splash link 22, and a slide ].

[0017] the helper spring which consists of a tension coil spring which made the load rate small by 30 making the diameter of a strand thin, enlarging a coil diameter, and making [ many ] number of turns, and made change of the load by elongation small -- it is -- said wind direction -- said wind direction when the actuation load of extent which offsets the weight of the modification plate 9 is extended -- it is made to generate when the modification plate 9 falls

[0018] This helper spring 30 hooked the end on the spring hook credit 31 formed near the head of said splash lever 25, hooked it on the spring hook credit 32 which formed the other end in said body casing 1, and has assisted actuation of said drive motor 24.

[0019] In the above-mentioned configuration, either drawing 1 thru/or drawing 5 are used and explained about the operation and effectiveness below. As shown in drawing 1 and drawing 2, the indoor air removed and attracted suspended particles of dust etc. by passing said filter 7 from inlet port 6 with said blower 10 Converge by said bell mouth 5 to the center of said blower fan 12, and it is drawn in, and is sent out to a circumferencial direction. By passing said heat exchanger 13, heat exchange is carried out, at the time of cooling, it is cold, and becomes the air warmly air-conditioned at the time of heating at it, and the air conditioning air blows off from said outlet 8 indoors through said cowling duct 15, and air-conditions the interior of a room.

[0020] By forming said outlet 8 annularly, the dead angle of air blasting in the direction of four corners is not produced like the head-lining flush type air conditioner of a type which prepared the outlet in four sides of perimeters of the makeup panel of the conventional rectangle, and homogeneity can be ventilated toward the indoor whole region in air conditioning air.

[0021] If the driving shaft 26 of said drive motor 24 rotates to the half-clockwise rotation of drawing 3 as shown in drawing 3, the splash lever 25 fixed so that it might not race by the D cut 27 to this driving shaft 26 will also be rotated in the same direction. then, the splash link 22 in which the interlocking pin 23 fitting of the slide of was made possible to the gold coin hole 29 of said splash lever 25 could pull up up, and formed this interlocking pin 23 and the sliding shaft 19 -- minding -- said wind direction -- the modification plate 9 can pull up up.

[0022] said wind direction -- since what interferes with the blowdown under said outlet 8 when the modification plate 9 can pull up up is lost, the air conditioning air which has passed along said cowling duct 15 blows off from said outlet 8 downward like the arrow head S1 of drawing 3.

[0023] As shown in drawing 4, the driving shaft 26 of said drive motor 24 also rotates the splash lever 25 which is drawing and which was fixed to this driving shaft 26 when it rotated clockwise in the same direction. then, said wind direction which the interlocking pin 23 fitting of the slide of was made possible to the gold coin hole 29 of said splash lever 25 is interlocked with through the splash link 22 and the sliding shaft 19 which fell caudad and formed this interlocking pin 23 -- the modification plate 9 falls caudad with a self-weight.

[0024] said wind direction -- the modification plate 9 falls caudad -- said wind direction -- the air conditioning air which has passed along said cowling duct 15 in order that the modification plate 9 may close the lower part of said outlet 8 -- the arrow head S2 of drawing 4 -- like -- said wind direction -- it blows off upward along the dip of the modification plate 9.

[0025] said wind direction -- since the air conditioning air which blows off by forming the modification plate 9 in the shape of [ which swelled caudad ] a curved surface can flow smoothly along a curved surface -- air blasting resistance -- being generated -- being hard -- air blasting effectiveness can be improved.

[0026] since said sliding shaft 19 is guided to the guide slot 21 formed in the guide rib 20 -- said wind direction -- the parallel displacement of the modification plate 9 is carried out only in the vertical direction. said wind direction -- since the modification plate 9 does not need to be twisted by carrying out a parallel displacement only in the vertical direction, it can be annularly considered as 1 relation. Moreover, the duty which connects said makeup panel 3 divided in and abroad by said annular outlet 8, and is unified has also achieved said guide rib 20.

[0027] it is shown in drawing 2 and drawing 5 -- as -- said sliding shaft 19 and said guide rib 20 -- said annular wind direction -- said wind direction which became 1 relation annularly by preparing three places in the location which divided the modification plate 9 equally abbreviation 3, and forming the driving gear which consists of said drive-motor 24 grade for every part -- the modification plate 9 is smooth, without being inclined or caught -- it can go up and down up and down.

[0028] Since position control is possible in open-loop by being a stepping motor with the number of steps, a sensor etc. is not needed but, as for said drive motor 24, an up-and-down halt location can be determined. Therefore, while being able to consider as a cheap configuration, it also becomes easy to take three synchronizations and a halt in the arbitration location in the middle of the upper and lower sides of it is still also attained. In addition, when said drive motor 24 is made into the usual DC motor etc., actuation can be made possible by using the equipments (for example, microswitch etc.) which detect a vertical location. (Graphic display abbreviation)

[0029] the splash edge of said splash lever 25 -- said wind direction -- since the load of said drive motor 24 can be made small by assisting in the pull-up direction by said helper spring 30 of the actuation load of extent which offsets the weight of the modification plate 9, the rated load of said drive motor 24 can be lowered, and it can be made cheap.

[0030] said wind direction -- by forming the modification plate 9 and said sliding shaft 19 in one with injection molding with synthetic resin, such as ABS (acrylic nitril styrene butadiene rubber), it can consider as little cheap configuration of components mark. In addition, it can be made possible by considering as the configuration where the upper part of said guide slot 21 or a lower part was opened to let said unified sliding shaft 19 pass to said guide slot 21. (Graphic display abbreviation)

[0031] Next, the second example of this invention shown with the important section sectional view of drawing 6 is explained. the first example of the above -- said wind direction -- the configurations of the driving source which drives the modification plate 9 in the vertical direction differ. The solenoid which is the driving source to which 33 drives the splash edge of said splash link 22 in the vertical direction, and 34 are moving cores as for which this solenoid 33 carries out slide actuation up and down, and this moving core 34 is connected with said splash link 22 by the interlocking pin 35.

[0032] when it energizes to said solenoid 33, it is shown in drawing 6 -- as -- said moving core 34 -- the upper part -- drawing in -- said wind direction -- the modification plate 9 moves up. the force of attracting said moving core 34 up if the energization to said solenoid 33 is stopped --

-- being lost -- said wind direction -- the modification plate 9 falls below with a self-weight.

(Graphic display abbreviation)

[0033] according to the example of \*\*\*\* 2 -- said wind direction -- since the components which constitute the driving source which drives the modification plate 9 in the vertical direction require said only solenoid 33, it can consider as a cheap configuration.

[0034] In addition, in the second example of the above, when it energized to said solenoid 33, the thing of the type by which said moving core 34 is attracted up was used, but if said moving core 34 can be pulling up up by work of a spring and energizes when not energizing, reverse may use for the force of the spring the solenoid of the type caudad attracted in said moving core 34.

(Graphic display abbreviation)

[0035]

[Effect of the Invention] according to [ as explained above ] this invention -- the vertical direction -- a wind direction -- it becomes the head-lining flush type air conditioner which prepared the annular outlet in the round makeup panel which can be adjusted.

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**DESCRIPTION OF DRAWINGS**

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view showing the whole head-lining flush type air conditioner configuration by this invention.

[Drawing 2] It is the top view seen from the lower part which shows the whole head-lining flush type air conditioner configuration by this invention.

[Drawing 3] the important section sectional view showing the first example of the head-lining flush type air conditioner by this invention -- it is -- a wind direction -- the condition of having raised the modification plate is shown.

[Drawing 4] the important section sectional view showing the first example of the head-lining flush type air conditioner by this invention -- it is -- a wind direction -- the condition of having dropped the modification plate is shown.

[Drawing 5] the wind direction of the head-lining flush type air conditioner by this invention -- it is the perspective view showing a modification plate.

[Drawing 6] the important section sectional view showing the second example of the head-lining flush type air conditioner by this invention -- it is -- a wind direction -- the condition of having raised the modification plate is shown.

[Description of Notations]

1 Body Casing

2 Head-Lining Side

3 Makeup Panel

6 Inlet Port

8 Outlet

9 Wind Direction -- Modification Plate

10 Blower  
11 Motor  
12 Fan  
13 Heat Exchanger  
15 Cowling Duct  
16 Periphery Side of Outlet  
17 Inner Circumference Side of Outlet  
18 Notch  
19 Sliding Shaft  
20 Guide Rib  
21 Guide Slot  
22 Splash Link  
24 Drive Motor (Stepping Motor)  
25 Splash Lever  
26 Driving Shaft  
30 Helper Spring  
33 Solenoid

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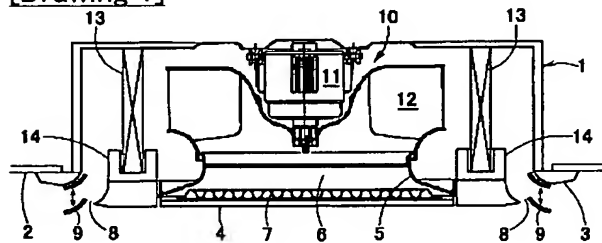
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**DRAWINGS**

[Drawing 1]



[Drawing 2]



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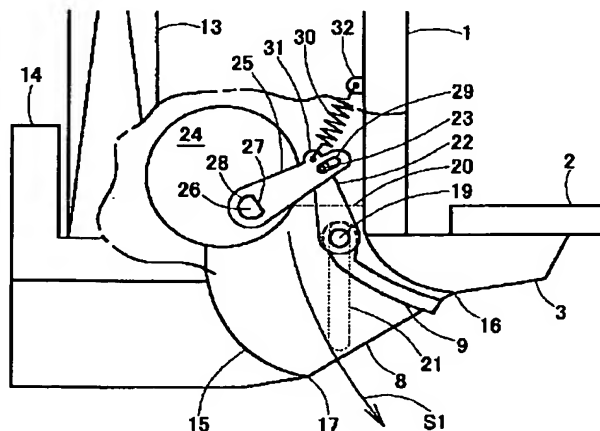
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(54) 【発明の名称】 天井埋込形空気調和機

(57) 【要約】

【課題】 上下方向に風向調整することが可能な丸形の化粧パネルに環状の吹出口を設けた天井埋込形空気調和機を提供する。

【解決手段】 環状の吹出口8への導風路15を外周方向に傾斜させ、前記吹出口8の開口部の外周側16が内周側17より高い位置になるように形成し、前記吹出口8の開口部に外周側が内周側より下がるように傾斜した環状の風向変更板9を設け、同風向変更板9を上下方向に平行移動するように駆動することにより、上下方向に風向を変更する。



## 【特許請求の範囲】

【請求項1】 天井面に埋め込まれた円筒状の本体ケーシングの下面に、中央に円形の吸込口を設け同吸込口の周囲に環状の吹出口を設けた円形の化粧パネルが取り付けられ、前記本体ケーシング内に形成された前記吸込口と前記吹出口とを結ぶ空気通路に、前記吸込口に対向して上下方向の駆動軸を有したモータとファンからなる送風機と同送風機を囲うように配置された円形の熱交換器とを設けてなる天井埋込形空気調和機において、前記環状の吹出口への導風路を外周方向に傾斜させ、前記吹出口の開口部の外周側が内周側より高い位置になるように形成し、前記吹出口の開口部に外周側が内周側より下がるように傾斜した環状の風向変更板を設け、同風向変更板を上下方向に平行移動するように駆動することにより、上下方向に風向を変更してなることを特徴とする天井埋込形空気調和機。

【請求項2】 前記風向変更板を駆動する駆動装置を、前記環状の風向変更板の一部を円周に対し直角方向に切り欠いた切欠き部と、同切欠き部を連結するように設けた摺動軸と、同摺動軸を上下方向にガイドするガイド溝を備え前記吹出口に円周に対し直角方向に設けたガイドリブと、前記摺動軸に揺動自在に設けた揺動リンクと、同揺動リンクの揺動端を略上下方向に駆動する駆動源とから構成したことを特徴とする請求項1記載の天井埋込形空気調和機。

【請求項3】 前記駆動源を、駆動モータと、同駆動モータの駆動軸に揺動自在に設け、その揺動端を前記揺動リンクの揺動端とスライド可能に連結した揺動レバーとから構成したことを特徴とする請求項2記載の天井埋込形空気調和機。

【請求項4】 前記駆動モータを、ステッピングモータとしてなることを特徴とする請求項3記載の天井埋込形空気調和機。

【請求項5】 前記揺動レバーの揺動端を、前記風向変更板の重量を相殺する作動力の補助パネにより引上げ方向に補助してなることを特徴とする請求項3記載の天井埋込形空気調和機。

【請求項6】 前記駆動源を、ソレノイドとし、同ソレノイドの作動軸に前記揺動リンクの揺動端を連結してなることを特徴とする請求項2記載の天井埋込形空気調和機。

【請求項7】 前記駆動装置を、前記環状の風向変更板を円周方向に略3等分した位置に3つ設けてなることを特徴とする請求項2記載の天井埋込形空気調和機。

【請求項8】 前記風向変更板を、下方に膨らんだ曲面状に形成してなることを特徴とする請求項1記載の天井埋込形空気調和機。

【請求項9】 前記風向変更板と前記摺動軸とを一体に形成してなることを特徴とする請求項2記載の天井埋込形空気調和機。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、天井埋込形空気調和機に係わり、より詳細には、吹出口の形状が環状の天井埋込形空気調和機の風向変更板の構成に関する。

## 【0002】

【従来の技術】従来の天井面に設置した丸形の化粧パネルに環状の吹出口を設けた天井埋込形空気調和機（以下、丸形の天井埋込形空気調和機と呼ぶ）は、例えば特開平11-201494号公報にて示されるように、環状の吹出口に、円周に対し直角方向に放射状に配設された複数の風向変更板を設け、同風向変更板を円周方向に傾動させて、風向を調整する構成であった。また、従来の天井面に設置した方形の化粧パネルの周囲4辺に吹出口を設けた天井埋込形空気調和機（以下、方形の天井埋込形空気調和機と呼ぶ）は、例えば特開平10-292945号公報にて示されるように、4辺の各吹出口に傾動する風向変更板を設け風向を上下に調整する構成であった。

## 【0003】

【発明が解決しようとする課題】しかしながら、上記構成の丸形の天井埋込形空気調和機においては、円周に対し直角方向に放射状に整流して送風し、その送風を上下方向に風向調整することができないという問題点があった。また、丸形の天井埋込形空気調和機において、吹出口の長手方向に延伸した風向変更板を適用した場合、風向変更板を環状の吹出口の形に対応して長手方向に曲がった形にする必要があるため、従来の方形の天井埋込形空気調和機のように傾動することができなくなり、上下方向の風向調整ができないという問題点があった。本発明においては、上記の問題点に鑑み、上下方向に風向調整することが可能な丸形の化粧パネルに環状の吹出口を設けた天井埋込形空気調和機を提供することを目的とする。

## 【0004】

【課題を解決するための手段】本発明は、上記課題を解決するため、天井面に埋め込まれた円筒状の本体ケーシングの下面に、中央に円形の吸込口を設け同吸込口の周囲に環状の吹出口を設けた円形の化粧パネルが取り付けられ、前記本体ケーシング内に形成された前記吸込口と前記吹出口とを結ぶ空気通路に、前記吸込口に対向して上下方向の駆動軸を有したモータとファンからなる送風機と同送風機を囲うように配置された円形の熱交換器とを設けてなる天井埋込形空気調和機において、前記環状の吹出口への導風路を外周方向に傾斜させ、前記吹出口の開口部の外周側が内周側より高い位置になるように形成し、前記吹出口の開口部に外周側が内周側より下がるように傾斜した環状の風向変更板を設け、同風向変更板を上下方向に平行移動するように駆動することにより、上下方向に風向を変更した構成となっている。

【0005】また、前記風向変更板を駆動する駆動装置を、前記環状の風向変更板の一部を円周に対し直角方向に切り欠いた切欠き部と、同切欠き部を連結するように設けた摺動軸と、同摺動軸を上下方向にガイドするガイド溝を備え前記吹出口に円周に対し直角方向に設けたガイドリブと、前記摺動軸に揺動自在に設けた揺動リンクと、同揺動リンクの揺動端を略上下方向に駆動する駆動源とから構成している。

【0006】また、前記駆動源を、駆動モータと、同駆動モータの駆動軸に揺動自在に設け、その揺動端を前記揺動リンクの揺動端とスライド可能に連結した揺動レバーとから構成している。

【0007】また、前記駆動モータを、ステッピングモータとした構成となっている。

【0008】また、前記揺動レバーの揺動端を、前記風向変更板の重量を相殺する作動力の補助バネにより引上げ方向に補助した構成となっている。

【0009】また、前記駆動源を、ソレノイドとし、同ソレノイドの作動軸に前記揺動リンクの揺動端を連結した構成となっている。

【0010】また、前記駆動装置を、前記環状の風向変更板を円周方向に略3等分した位置に3つ設けた構成となっている。

【0011】また、前記風向変更板を、下方に膨らんだ曲面状に形成した構成となっている。

【0012】更に、前記風向変更板と前記摺動軸とを一体に形成した構成となっている。

【0013】

【発明の実施の形態】図1乃至図6にて示す本発明の実施例により、本発明の実施の形態について説明する。先ず、図1の断面図と図2の下方から見た平面図にて示す、本発明の天井埋込形空気調和機の全体構成について説明する。1は天井面2に埋め込まれた円筒状の本体ケーシング、3は同本体ケーシング1の下方を覆い前記天井面2に接するように設けられた化粧パネル、4は同化粧パネル3の中央に設けベルマウス5を備えた円形の吸込口6を開閉自在に覆い背面にフィルタ7を備えた吸込グリル、8は前記吸込口6の周囲に環状に形成され風向変更板9を備えた吹出口、10は前記本体ケーシング1内に形成された前記吸込口6と前記吹出口8とを結ぶ空気通路に、前記吸込口6に対向して設けられた上下方向の駆動軸を有したモータ11とファン12からなる送風機、13は同送風機10を囲うように設けられた円形の熱交換器、14は同熱交換器13の下方に設けられた露受皿である。

【0014】次に、図1の断面図、図2の下方から見た平面図、図3と図4の要部断面図および図5の風向変更板の斜視図にて示す、本発明の第一の実施例について説明する。15は前記吹出口8に前記熱交換器13を通過した空調空気を導く外周方向に傾斜した導風路であり、

前記吹出口8の開口部の外周側16が内周側17より高い位置になるように形成されている。また、前記吹出口8の開口部には、前記風向変更板9が、外周側が内周側より下がるように傾斜されるとともに、下方に膨らんだ曲面状に形成され、前記環状の吹出口8の形状に沿った環状にABS（アクリルニトリルブタジエンスチレン）等の合成樹脂により形成されて設けられている。

【0015】18は前記環状の風向変更板9の円周方向に略3等分した位置の3箇所を円周に対し直角方向に切り欠いた切欠き部、19は同切欠き部18を連結するように設け前記風向変更板9と一体に形成された摺動軸、20は同摺動軸19を上下方向にガイドするガイド溝21を形成し前記導風路15に円周に対し直角方向に設けたガイドリブ、22は前記摺動軸19に揺動自在に設け、その揺動端に連動ピン23を備えた揺動リンク、24と25とは同揺動リンク22の揺動端を略上下方向に駆動する駆動源であるところの駆動モータと揺動レバーとである。上記のようにして前記風向変更板9の駆動装置が構成されている。

【0016】前記駆動モータ24にはステッピングモータが用いられ、前記駆動モータ24の駆動軸26と前記揺動レバー25とはDカット27とDカット孔28とにより空転しないように嵌合されている。前記揺動レバー25の先端近傍には小判孔29が形成され、前記揺動リンク22の連動ピン23とスライド可能に嵌合している。

【0017】30は素線の直径を細くし、コイル径を大きくし、巻数を多くすることによりバネ定数を小さくして伸びによる荷重の変化を小さくした引張りコイルバネからなる補助バネであり、前記風向変更板9の重量を相殺する程度の作動力を伸びたとき、すなわち前記風向変更板9が下がったときに発生させる。

【0018】同補助バネ30は、一端を前記揺動レバー25の先端近傍に形成したバネフック掛け31に引っ掛け、他端を前記本体ケーシング1に形成したバネフック掛け32に引っ掛け、前記駆動モータ24の作動を補助している。

【0019】上記構成において、次にその作用と効果について図1乃至図5のいずれかを用いて説明する。図1と図2とに示すように、前記送風機10により吸込口6から前記フィルタ7を通過し浮遊塵等を除去され吸引された室内空気は、前記ベルマウス5により前記送風ファン12の中央へ収束されて吸引され円周方向に送り出され、前記熱交換器13を通過することにより熱交換されて冷房時には冷たく、暖房時には暖かく空調された空気となり、その空調空気は前記導風路15を通過して前記吹出口8より室内に吹き出され、室内を空調する。

【0020】前記吹出口8が環状に形成されていることにより、従来の方形の化粧パネルの周囲4辺に吹出口を設けたタイプの天井埋込形空気調和機のように四隅方向

に送風の死角を生じることがなく、空調空気を室内全域に向かって均一に送風することができる。

【0021】図3に示すように、前記駆動モータ24の駆動軸26が図の半時計方向に回転すると、同駆動軸26にDカット27により空転しないように固定された揺動レバー25も同一方向に回転する。すると前記揺動レバー25の小判孔29にスライド可能に嵌合された連動ピン23が上方に引き上げられ、同連動ピン23を設けた揺動リンク22と摺動軸19とを介して前記風向変更板9が上方に引き上げられる。

【0022】前記風向変更板9が上方に引き上げられることにより、前記吹出口8の下方に吹き出しの邪魔をするものがなくなるため、前記導風路15を通ってきた空調空気は前記吹出口8から図3の矢印S1のように下向きに吹き出される。

【0023】図4に示すように、前記駆動モータ24の駆動軸26が図の時計方向に回転すると、同駆動軸26に固定された揺動レバー25も同一方向に回転する。すると前記揺動レバー25の小判孔29にスライド可能に嵌合された連動ピン23が下方に下がり、同連動ピン23を設けた揺動リンク22と摺動軸19とを介して連動する前記風向変更板9が自重により下方に下がる。

【0024】前記風向変更板9が下方に下がることにより、前記風向変更板9が前記吹出口8の下方を塞ぐため、前記導風路15を通ってきた空調空気は図4の矢印S2のように前記風向変更板9の傾斜に沿って上向きに吹き出される。

【0025】前記風向変更板9は下方に膨らんだ曲面状に形成されていることにより、吹き出される空調空気が曲面に沿ってスムーズに流れることができるため、送風抵抗を生じ難くなり、送風効率を向上することができる。

【0026】前記摺動軸19はガイドリブ20に形成されたガイド溝21にガイドされているため、前記風向変更板9は上下方向のみに平行移動する。前記風向変更板9は上下方向のみに平行移動することにより、捩れる必要がないため、環状に一繋がりとすることができる。また、前記ガイドリブ20は、前記環状の吹出口8により内外に分断された前記化粧パネル3を繋ぎ一体化する役目も果たしている。

【0027】図2と図5とに示すように、前記摺動軸19と前記ガイドリブ20とは、前記環状の風向変更板9を略3等分した位置に3箇所設け、各箇所毎に前記駆動モータ24等からなる駆動装置を設けることにより、環状に一繋がりとなった前記風向変更板9は傾いたり、引っ掛かったりすることなく、スムーズ上下に昇降することができる。

【0028】前記駆動モータ24はステッピングモータであることにより、ステップ数によりオープンループで位置制御ができるため、上下の停止位置をセンサ等を必

要とせず決定することができる。したがって、安価な構成とすることができるとともに、3箇所同期を取るのも容易となり、更に上下の途中の任意位置での停止も可能となる。なお、前記駆動モータ24を通常の直流モータ等にした場合は、上下位置を検知する装置（例えばマイクロスイッチ等）を用いることにより、作動可能とすることができる。（図示省略）

【0029】前記揺動レバー25の揺動端を、前記風向変更板9の重量を相殺する程度の作動力の前記補助パネ30により引上げ方向に補助することにより、前記駆動モータ24の負荷を小さくすることができるため、前記駆動モータ24の定格負荷を下げることができ、安価にすることができる。

【0030】前記風向変更板9と前記摺動軸19とをABS（アクリルニトリルブタジエンスチレン）等の合成樹脂により射出成形にて一体に形成することにより、部品点数の少ない安価な構成とすることができる。なお、一体化された前記摺動軸19を前記ガイド溝21へ通すことは、例えば、前記ガイド溝21の上方あるいは下方を開放した形状とすることにより可能とすることができる。（図示省略）

【0031】次に、図6の要部断面図にて示す本発明の第二の実施例について説明する。上記第一の実施例とは、前記風向変更板9を上下方向に駆動する駆動源の構成が異なる。33は前記揺動リンク22の揺動端を上下方向に駆動する駆動源であるところのソレノイド、34は同ソレノイド33の上下にスライド動作する可動鉄心であり、同可動鉄心34は前記揺動リンク22と連動ピン35にて連結している。

【0032】前記ソレノイド33に通電すると、図6に示すように前記可動鉄心34を上方に吸引し、前記風向変更板9が上方に移動する。前記ソレノイド33への通電を止めると、前記可動鉄心34を上方に吸引する力はなくなり、前記風向変更板9は自重により下方へ下がる。（図示省略）

【0033】本第二の実施例によると、前記風向変更板9を上下方向に駆動する駆動源を構成する部品が前記ソレノイド33のみで済むため、安価な構成とすることができる。

【0034】なお、上記第二の実施例においては、前記ソレノイド33に通電したときに前記可動鉄心34が上方に吸引されるタイプのものを用いたが、通電しないときには前記可動鉄心34がバネの働きで上方に引き上げられており、通電するとそのバネの力に逆らって前記可動鉄心34を下方に吸引されるタイプのソレノイドを用いても良い。（図示省略）

【0035】

【発明の効果】以上説明したように、本発明によれば、上下方向に風向調整することが可能な丸形の化粧パネルに環状の吹出口を設けた天井埋込形空気調和機となる。

## 【図面の簡単な説明】

【図1】本発明による天井埋込形空気調和機の全体構成を示す断面図である。

【図2】本発明による天井埋込形空気調和機の全体構成を示す下方から見た平面図である。

【図3】本発明による天井埋込形空気調和機の第一の実施例を示す要部断面図であり、風向変更板を上昇させた状態を示す。

【図4】本発明による天井埋込形空気調和機の第一の実施例を示す要部断面図であり、風向変更板を下降させた状態を示す。

【図5】本発明による天井埋込形空気調和機の風向変更板を示す斜視図である。

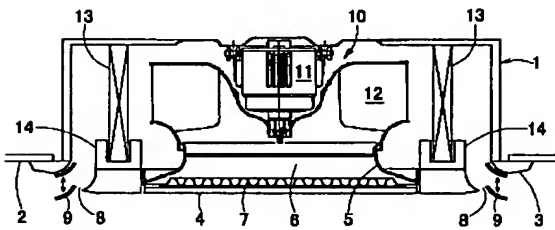
【図6】本発明による天井埋込形空気調和機の第二の実施例を示す要部断面図であり、風向変更板を上昇させた状態を示す。

## 【符号の説明】

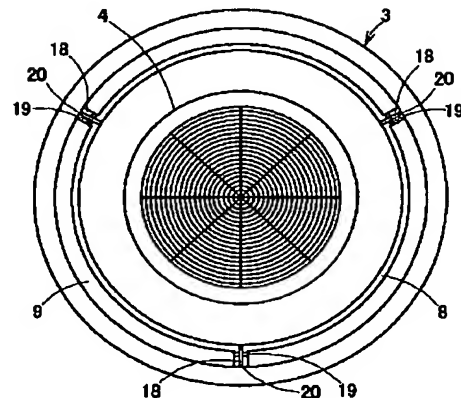
- 1 本体ケーシング
- 2 天井面
- 3 化粧パネル

- \* 6 吸込口
- 8 吹出口
- 9 風向変更板
- 10 送風機
- 11 モータ
- 12 ファン
- 13 熱交換器
- 15 導風路
- 16 吹出口の外周側
- 17 吹出口の内周側
- 18 切欠き部
- 19 摺動軸
- 20 ガイドリブ
- 21 ガイド溝
- 22 揺動リンク
- 24 駆動モータ（ステッピングモータ）
- 25 揺動レバー
- 26 駆動軸
- 30 補助バネ
- \* 20 33 ソレノイド

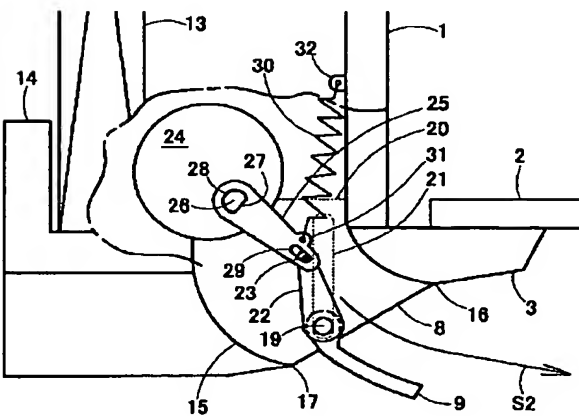
【図1】



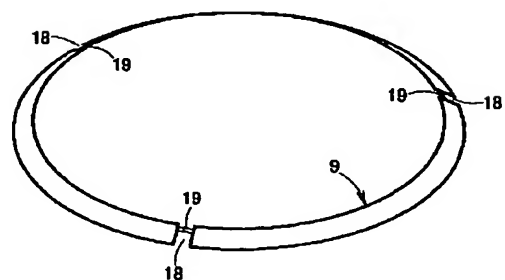
【図2】



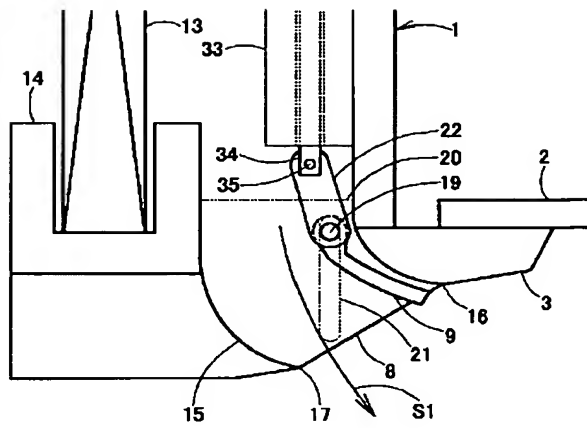
【図4】



【図5】



【図6】



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